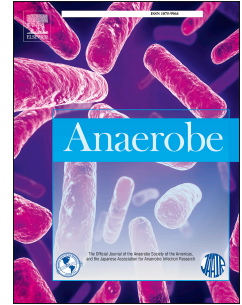


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1 Effect of oligosaccharides on the adhesion of gut bacteria to human HT-29 cells

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10 Abstract

11 The influence of five oligosaccharides (cellobiose, stachyose, raffinose, lactulose and chito-
12 oligosaccharides) on the adhesion of eight gut bacteria (*Bifidobacterium bifidum* ATCC 29521,
13 *Bacteroides thetaiotaomicron* ATCC 29148D-5, *Clostridium leptum* ATCC29065, *Blautia coccooides* ATCC
14 29236, *Faecalibacterium prausnitzii* ATCC 27766, *Bacteroides fragilis* ATCC 23745, *Clostridium difficile*
15 ATCC 43255 and *Lactobacillus casei* ATCC 393) to mucous secreting and non-mucous secreting HT-29
16 human epithelial cells, was investigated. In pure culture, the bacteria showed variations in their ability to
17 adhere to epithelial cells. The effect of oligosaccharides diminished adhesion and the presence of mucus
18 played a major factor in adhesion, likely due to high adhesiveness to mucins present in the native
19 human mucus layer covering the whole cell surface. However, clostridia displayed almost the same level
20 of adhesion either with or without mucus being present. *Bl. coccooides* adhesion was decreased by
21 stachyose and cellobiose in non-mucus-secreting cells in pure culture, while in mixed faecal culture
22 cellobiose displayed the highest antiadhesive activity with an overall average of 65% inhibition amongst
23 tested oligomers and lactulose displayed the lowest with an average of 47.4%. Bifidobacteria,
24 *Bacteroides*, lactobacilli and clostridia were inhibited within the following ranges 47-78%, 32-65%, 11.7-
25 58% and 64-85% respectively. This means that clostridia were the most strongly influenced members of
26 the microflora amongst the bacterial groups tested in mixed culture.

27 In conclusion, introducing oligosaccharides which are candidate prebiotics into pure or mixed cultures
28 has affected bacterial adhesion.

29 Key words: Oligosaccharides, gut microflora, prebiotics, antiadhesion, HT-29 cells

30 1. Introduction

31 Microbial adhesion to host cells is the first step to colonization and biofilm formation [1]. The normal
32 microflora in the gut form a barrier against pathogens and reduce adhesion and colonization [2]. In
33 addition, mucosal secretions help to wash these pathogens away. For a bacterial cell, either beneficial or
34 harmful, to successfully colonize the gut, they need to use certain mechanisms to overcome the mucosal
35 cleansing [3] and space competition amongst different microbes. Such mechanisms involve proteins
36 (adhesins, lectins and haemagglutinins) which recognize oligosaccharides with 3-5 monosaccharide

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